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Abstract

NEW HYDROMETALLURGICAL TRENDS IN THE URANIUM INDUSTRY

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The uranium industry is at present going through a period in which reduction of costs must be regarded as one of principal objectives to be pursued.

Two methods of achieving this purpose are:

(a) refinement of existing techniques, with a view to deriving maximum yield therefrom;

(b) replacement of the present intermediate products by others offering better economic and technical prospects.

The Hydrometallurgical Groups of the National Atomic Energy Commission (NAEC) are carrying out a programme of tests involving application of both methods to the solid and liquid ion exchange technique, which is the one most commonly encountered in uranium technology.

For liquid ion exchangers, a comparative study has been carried out with a view to maximum utilization of their specific properties.

The first part of the paper contains a summary of the results of "preliminary tests" associated with any operation of this type, in order to facilitate the selection of the aminic solvent most suitable under the desired conditions.

With this purpose in view the paper offers a comparative study of the behaviour of certain amines with acid leachates, the results being expressed in the form of equilibrium curves, effect of pH, phase separation resolving power, effect of the diluent, and so on.

The results obtained show the undeniable advantages, under normal operating conditions, of certain tertiary amines over the others tested.

The second part of the paper, dealing with the search for new intermediate products, shows the results of studies on the potentialities of uranium carbonate compounds, particularly uranyl tricarbonate of ammonium (UTC) as a substitute for yellow cake.

UTC is highly versatile from the chemical and technological points of view, and its preparation is studied in connection with the technology of both solid and liquid ion exchange substances.

For each case a study is made of the conditions of preparation, the elimination of interfering factors, operating conditions and so on.

For solid ion exchange substances, the paper gives the results obtained with the delayed spontaneous crystallization technique, while for liquid ion exchangers the results of direct precipitating elution are quoted.

The paper concludes by analysing the prospects for preparing other materials on the basis of UTC, and gives a summary analysis of their respective economic advantages.